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A Report on the Use of Chlorpromazine Hydrochloride in Domestic Animals

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Introduction

CHLORPROMAZINE hydrochloride ("Largactil" brand), a phenothiazine derivative, is chemically 3-chloro-10 (3'-dimethylamino-n-propyl) phenothiazine hydrochloride and, structurally, is closely related to the antihistamine compound "Phenergan" (promethazine hydrochloride). It has attained most prominence in anaesthesia, psychiatry, and general medicine in man, and would appear to have a significant place in the control and treatment of many conditions in domestic animals.

"Largactil" is a white crystalline powder which is stated to be very soluble in water (1 gramme in 2.5 c.c.), in methyl and ethyl alcohols, and in chloroform, but is insoluble in ether and benzene. The *p*H of a 5 per cent. aqueous solution is between 4 and 5.

Pharmacology

Chlorpromazine is a powerful central depressant probably acting (Terzian, 1952; 1953; Aron *et al.*, 1953) on the ascending reticular formation of the mid-brain which contains the centres for vomiting and temperature control, thereby also exerting a marked influence on activity of the central nervous system, including the autonomic nervous system, muscle tone, pituitary gland and thus providing a general sedative effect unique in expression, and differing from hitherto-used sedatives in that consciousness is retained. As a centrally acting anti-emetic "Largactil" is probably the most powerful known (Moyer *et al.*, 1954; Glaviano & Wang, 1954) and its action is believed to be due to its ability to depress the emetic chemoreceptor trigger zone and the vomiting reflex centrally. Its success in the prevention and even, when appropriately combined with fluid replacement, in the treatment of haemorrhagic shock has been attributed to its effect in producing vasodilatation and counteracting the anoxia (Fournel, 1952; Reilly & Tournier, 1954; Pocidalo & Tardieu, 1954; Jaulmes *et al.*, 1952; Lian, 1954; Hershey & Guccione, 1955). In this context it was demonstrated (Courvoisier *et al.*, 1953) that the intravenous injection of 2 mg. per kg. in dogs immediately after a severe haemorrhage completely protected them against the shock which caused 83 per cent. mortality in untreated controls. The results were fairly comparable in cats but less striking.

Peripherally, "Largactil" antagonises and sometimes reverses the pressor and vasoconstrictor action of adrenaline.

As with certain other phenothiazine derivatives, "Largactil" possesses powerful local anaesthetic properties (Burn, 1954), but it is not used for this purpose. Its undoubted ability to enhance the action of sedatives, analgesics, hypnotics, narcotics and anaesthetics, as with its ability to potentiate the effect of local anaesthetics, can be attributed purely to central action.

Toxicity

Acute and cumulative toxicity tests have shown (S.K.F., 1953; Dubost & Pascal, 1953; Dobkin *et al.*, 1954) "Largactil" to be well tolerated in domestic animals. Healthy dogs have received doses of 5 mg. per kg. daily for 30 days without any side-effect and on their being sacrificed, autopsy showed no histopathological change.

Contra-Indications

"Largactil" should be carefully employed in the following circumstances:—

1. Where severe depression of organs such as the brain or heart exists.

2. Where the animal is still under the influence of a central nervous depressant, *e.g.*, anaesthetic or narcotic.

3. Where extensive liver or lung lesions have been diagnosed.

CLINICAL USES

1. Sedation

Because of its central depressant action "Largactil" can be employed as a sedative in all species. Sedation has been defined as a mild state of central depression in which the patient, although awake, has a lessened degree of cortical excitability and is therefore more calm and tranquil. This is descriptive of the effect we have obtained with "Largactil." Barbiturates in dogs, when employed in the low dosage desirable for sedation, may instead produce excitement and when sedation does occur the animal may be in a stupor and be incapable of eating or drinking—thus defeating, partially, the original purpose. In our experience, employing recommended dosage, excitement or stupor should not occur with "Largactil" and truculent animals become tractable. The sedation obtained from either parenteral or oral use of "Largactil" may be utilised for many purposes, *e.g.*, the treatment of eyes, ears, or skin or for the relief of anxiety and pain. Many ophthalmic and aural conditions tend to clear up more rapidly when sedation is induced—thus preventing the rubbing or scratching of affected parts. "Largactil" has the ability to decrease the response to pruritus and pain and this property has proved to be of clinical value as an adjunct to the therapeutic approach in pathological conditions which otherwise would have been aggravated physically by the subject. This sedative action of "Largactil" may be of value in diseases of the nervous system, *e.g.*, epileptiform convulsions, hysteria, etc. It has been successfully used in the treatment of the anxiety produced by false pregnancy and nymphomania in bitches. It also allays the anxiety associated with pain, shock, trauma, pruritus, etc., or confinement. Kennelled dogs, under treatment, in our experience, rarely bark yet are quite alert to their surroundings and feed well. We have used doses varying from 1 to 10 mg. per kg. orally, and 0.5 to 8 mg. per kg. parenterally and our conclusions are that for sedation the best effect is obtained when, in small animals, 4 mg. per kg. is used orally or 2.5 mg. per kg. intramuscularly or intravenously as a daily treatment. For continuous therapy we used tablet medication. Over 50 small animals have been treated with "Largactil" solely for sedative purposes. In large animals, *e.g.*, horses and cattle, we advocate only the intramuscular use of "Largactil"—using a dosage of 1.5 mg. per kg., and this has been employed in horses to permit shoeing, clipping, etc., and as a sedative prior to travel by air, sea, or land and in other conditions, painful or otherwise, where sedation was indicated.

Typical case histories are:—

Case I. Sedation

Male cat, almost wild, had badly infected left hock following a bite. To permit examination and handling approximately 3 mg. per kg. "Largactil" 2.5 per cent. solution was given intramuscularly with some difficulty. After 45 minutes the cat was lifted to the table, examined, dressed, and a penicillin injection given without resentment being shown. The cat did not appear to be sedated in any respect yet handling was easy. The handling was continued for 15 minutes at the end of which time he began to spit.

Case II. Sedation in hysteria

Four-year-old fox-terrier bitch, 11 kg. bodyweight, suffered from hysteria whenever taken for a walk. She was given one 10 mg. tablet "Largactil" three times daily for 10 days. During treatment she did not exhibit hysteria when walked or when other dogs drew near. Treatment was continued giving one 25 mg. tablet daily for a week and during the following week only one 10 mg. tablet was given daily. The treatment finished seven months ago and there has so far been no recurrence of hysteria.

2. Pre-Anaesthetic Medication

When anaesthesia is to be induced the quantity of anaesthetic required will vary according to the reflex excitability of the nervous system and by diminishing these there will be a greater margin of safety. "Largactil" is indicated as a premedicant in all patients and particularly in the following categories:—

1. aged patients,
2. painful conditions where surgery is to be practised,
3. fevered animals,
4. the presence of thyroid disease,
5. toxaemic conditions,
6. excitable animals.

In our hands it has made anaesthesia more safe and comfortable for the animal and permits easier surgery. The calming effect of "Largactil" enables the chosen anaesthetic to be administered with the absolute minimum of excitement—a frequently difficult stage in most anaesthetic procedures.

Some degree of muscle relaxation together with some control of an excessive flow of mucus and saliva is also a surgical advantage. In addition struggling, barking and excitement during the post-anaesthetic recovery stage is usually absent.

Normally we employ "Largactil" intravenously or intramuscularly in dogs and cats but recommend only the intramuscular route in horses and cattle. If the intravenous route is used we wait five to eight minutes before giving the anaesthetic and 40 minutes when "Largactil" has been given intramuscularly. Naturally, because of the certainty and speed of action the intravenous route is preferred in small animals, in which anterior inco-ordination is produced in about two to three minutes, posterior paresis in four minutes and the animal lies down, is reluctant to move and will only do so uncertainly. In the majority of cases it has been possible to intubate

four to five minutes after administering "Largactil" without resentment by the subject. When employed in caesarean operations there has at no time been evidence of respiratory depression of the foetus and this is borne out in human medicine. The enhancement of anaesthetics has meant that when "Largactil" has been employed the quantity of anaesthetic required has been reduced by about 40 per cent. in the case of barbiturates and more when volatile anaesthetics are required. Some workers consider (Weaver & Hall, 1955; Schweizer, 1954) that in dogs and cats a dose as low as 1 mg. per kg. "Largactil" should be given either intravenously or intramuscularly; we have found 2 to 2.5 mg. per kg. has given us better results—sedation, muscular relaxation, etc., without respiratory depression. In horses and cattle we have successfully used 1.25 mg. per kg. intramuscularly for pre-anaesthetic medication. In determining and evaluating the dosage of "Largactil" more than 250 small animals have been used clinically.

Examples of cases treated:—

Case I. Enterotomy.

Mongrel collie bitch, five months old, weighing 6 kg., temperature was 100° F., pulse 136 and respirations 14.

History.—A foreign body—believed to be a bottle stopper—was in the bowel. It had been there for six weeks and the animal was in a very debilitated condition. Vomiting had been intermittent and very little food had been taken, but was always vomited—according to the owner's statement. Prognosis was grave because of the animal's condition.

Technique.—At 08.10 hours 13 mg. "Largactil" (0.5 c.c. of 2.5 per cent. solution) was given intravenously and paresis was produced within five minutes.

Between 08.15 and 08.45 hours 20 c.c. ether was administered. When the operation was about to start temperature was 98.5° F., pulse 120 and respirations 12.

Effects and comments.—Very little ether was required—no salivation, and the abdominal relaxation was very good. Immediately the foreign body (a rubber sucker) was removed the bowel tone improved and the bowel was contracting quite well by the time it was returned to the abdomen. Recovery was very rapid, free from noise and struggling, and 12 hours later the dog appeared perfectly normal and was clamouring for food.

Case II. Ovaro-hysterectomy

Ten-year-old mongrel bitch, weighing 13 kg. Temperature 102.5° F., pulse 122, respirations 30.

History.—Very fat animal, had been vomiting for several days and was now semi-comatose. Pyometra was diagnosed and ovaro-hysterectomy required although the prognosis was grave.

Technique.—At 19.30 hours 25 mg. "Largactil" (1 c.c. of 2.5 per cent. solution) was given intravenously. Posterior and then anterior paresis occurred, and the bitch apparently slept, though she raised her head on being called by name.

At 19.35 hours, 1.25 c.c. "Sagatal" (80 mg. pentobarbitone sodium) was given, at which time the temperature was 102° F., pulse 116, and respirations 28.

Effects and comments.—When pedal reflexes were lost ovaro-hysterectomy was carried out. There was no salivation and muscular relaxation was good. The recovery was quiet and rapid. No vomiting had occurred during the day after the operation so the animal was sent home where it continued to make a good recovery.

3. Anti-Emetic Action

"Largactil" is one of the most powerful anti-emetics owing its activity to central action. It is unlikely therefore to be of value where emesis is due to gastro-intestinal obstruction. It is described (Steigman & Vallbona, 1955) as having twice the effect, if given intravenously, of that provided when the intramuscular route is used. The dosage we have employed in small animals is 4 mg. per kg. orally preventatively, or 2 mg. per kg. intravenously or intramuscularly curatively with preference for the intramuscular route. Over 30 dogs have been used in confirming the anti-emetic action of "Largactil."

Typical case histories:—

Case I. Car sickness

Fox-terrier, 14 kg. bodyweight, habitually suffered from car sickness. Two 25 mg. tablets two to four hours before the journey prevented emesis. (It is interesting to note that in nine other cases half this dosage proved adequate. It is possible that finally no medication will be required as the animals become accustomed to travel.)

Case II. Pyometra

A five-year-old spaniel bitch of 18 kg. bodyweight unable to retain food was examined and pyometra diagnosed. Because of the animal's condition 37.5 mg. "Largactil" (1.5 c.c. of 2.5 per cent. solution) was given daily for three days until operation. During this time vomiting occurred only once (on first day) and some food was taken. The animal's general condition, particularly with regard to dehydration, improved and the operation and recovery were uneventful.

4. Heat Stroke

Heat stroke and collapse in dogs have been very satisfactorily overcome in three cases by the intramuscular use of "Largactil" 2.5 mg. per kg. and from Southern Rhodesia (Christie, 1953) we have been informed that 2 mg. per kg. intramuscularly cleared the condition known as "heat stroke" in cattle, in the animals treated.

Three cases of heat stroke which were encountered in bulldogs during July, 1955, were fairly similar in that the temperature was within 105° to 108° F., the respirations were laboured and gasping, pulse rapid, membranes injected and the dogs greatly distressed. Thirty minutes after 2.5 mg. per kg. "Largactil" was given intramuscularly and the animals placed in the coolest available surroundings, the respirations were normal and the anxiety was gone. All made uneventful recoveries without any other treatment.

5. Traumatic and Haemorrhagic Shock

As described in the section on pharmacology, "Largactil" has been shown to be of value in both of these conditions. Its adrenolytic action abolishes vasoconstriction and the relaxed vascular bed allows easy passage of blood. We recommend fluid replacement simultaneously to restore a normal blood volume.

6. Local Anaesthesia

When "Largactil" is given intravenously (five minutes), or intramuscularly (40 minutes), before a local anaesthetic there is marked increased tolerance to interference and this technique has been sufficient in all cases (over 25) to permit minor surgical procedures. These animals would probably have shown resistance had "Largactil" not been employed.

It is also important to observe that for complete muscular relaxation in "Largactil" medicated animals less than the normally recommended dose of muscle relaxant drugs is required.

Typical case histories:—

Case I

A nine-year-old Alsatian bitch weighing 25 kg. suffering from an ulcerating epithelioma on the right flank which was causing considerable irritation to the dog. The subject was blind and very nervous. "Largactil" was injected intravenously (50 mg., that is, 2 c.c. of a 2.5 per cent. solution), and after five minutes the bitch was completely relaxed and made no response to the injection of a local anaesthetic. She returned to normal immediately after the operation was completed but made no movement during it. She showed no distress at the strange surroundings and showed no reluctance to entering the surgery a week later for removal of stitches.

Case II.

A six-year-old bulldog bitch weighing 25 kg. had a mammary tumour to be removed. Owing to the difficulty of anaesthetising bulldogs and the fact that the owners did not want a general anaesthetic to be used, it was decided to use "Largactil" plus a local anaesthetic.

"Largactil" was given intravenously (50 mg., that is, 2 c.c. of a 2.5 per cent. solution), and after five minutes—since the animal offered no resistance—she was turned on her back, and showed no response to the injection of the local anaesthetic. The removal of the mammary tumour was performed without any movement of the bitch, and on its completion the bitch stood, with a little support, to be bandaged, afterwards lying quietly unless disturbed. There was little interference with breathing during the period of sedation.

7. Tetanus

In four horses suffering from tetanus we found that the use of "Largactil" intramuscularly, 2 mg. per kg., daily, gave sedation and some degree of muscle relaxation of benefit to the treatment. We now believe, however, that the intramuscular use of 1 mg. per kg. every eight hours, or a smaller dosage at much shorter intervals would possibly have exerted a more profound and beneficial effect, but have not had the opportunity of trying this technique (Hougs & Anderson, 1954; Weinreich, 1954; Brancadoro & Visconti, 1954; Owen, 1955). We have been informed by a correspondent (Sutherland, 1955) that this approach produced very successful results.

8. Colic in Horses

Five cases of spasmodic colic have responded satisfactorily to an intramuscular injection of "Largactil" (1.5 mg. per kg.). The symptoms disappeared within 30 minutes and did not recur. No other treatment was given.

Summary

We have found chlorpromazine hydrochloride ("Largactil") a very useful product for use in domestic animals. It has been used as a premedicant to anaesthesia, general and local, and as a sedative in painful and pruritic conditions. As an anti-emetic owing its activity to central action it is possibly the most active known. In traumatic and haemorrhagic shock in dogs, tetanus, and spasmodic colic in horses, "Largactil" gave very good results. Obviously, because of the numerous pharmacological properties of "Largactil" there are many other indications for its employment and these will be appreciated with the wider use of the product.

References

ARON, E., CHAMBON, Y., & VOISIN, A. (1953). *Bull. Acad. nat. Med.* **137.** 417.
BRANCADORO, G., & VISCONTI, S. (1954). *Gior. ital. Chir.* **10.** 830.
BURN, J. H. (1954). *Proc. R. Soc. Med.* **47.** 617.
CHRISTIE, C. J. (1953). Private Communication.
COURVOISIER, S., FOURNEL, J., DUCROT, R., KOLSKY, M., & KOETSCHET, P. (1953). *Arch. int. Pharmacodyn.* **92.** 305.
DOBKIN, A. B., GILBERT, R. G. B., & LAMOUREUX, L. (1954). *Anaesthesia.* **9.** 3, 157.
DUBOST, P., & PASCAL, S. (1953). *Ann. Pharm. franc.* **11.** 615.
FOURNEL, J. (1952). *C.R. Soc. Biol.* **146.** 561.
GLAVIANO, V. V., & WANG, S. C. (1954). *Fed. Proc.* **13.** 358.
HERSHEY, S. G., & GUCCIONE, I. (1955). *Ibid.* **14.** 1, 351.
HOUGS, W., & ANDERSON, E. W. (1954). *Acta. Pharm. et Toxic.* **10.** 3, 227.
JAULMES, C., LABORIT, H., & BENITTE, A. (1952). *C.R. Acad. Sci.* **234.** 372.
LIAN, C. (1954). *J. Amer. med. Ass.* **154.** 1043.
MOYER, J. H., MORRIS, G. C., HANDLEY, C. A., KENT, B., & MATHEWS, W. (1954). *A.M.A. Arch. intern. Med.* **94.** 497.
OWEN, L. N. (1955). *Lancet.* **2.** 349.
POCIDALO, J. J., & TARDIEU, C. (1954). *C.R. Soc. Biol.* **148.** 452.
REILLY, J., & TOURNIER, P. (1954). *Bull. Soc. med. Hôp.* **70.** 15.
S.K.F. (1953). Private Communication.
SCHWEIZER, R. (1954). *Schweiz. Arch. Für Tier.* **96.** 143.
STEIGMAN, A. J., & VALLBONA, C. (1955). *J. Pediat.* **46.** 296.
SUTHERLAND, G. N. (1955). Private Communication.
TERZIAN, H. (1952). *Rass. Neurol. veget.* **9.** 211.
———. (1953). *Ibid.* **10.** 23.
WEAVER, B., & HALL, L. W. (1955). Private Communication.
WEINREICH, M. (1954). *Zbl. Chir.* **79.** 760.

SHEEP WORRYING

Two helicopters from the Royal Naval Air Station, Lossiemouth, and a large number of armed farmers, gamekeepers, and police were employed to try to find two killer dogs which had been ravaging sheep flocks in the hilly area of central Morayshire.

In a month the dogs, believed to be collies, have killed or severely injured more than 60 sheep. Plans for the drive were made at a meeting of farmers, police, and Admiralty representatives at Elgin.

A Study of Reticulo-ruminal Motility in Adult Cattle in Relation to Bloat and Traumatic Reticulitis with an Account of the Latter Condition as seen in a General Practice*

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PART I.—A Study of Reticulo-ruminal Motility in Adult Cattle with Reference to the Eructation of Ruminal Gases and Bloat

Introduction

THE observations recorded here were undertaken to establish the normal variations that occur in the movements of the rumen of cattle; to relate them to reticular movement in a manner that can be used clinically, and to see whether knowledge so obtained was useful in the diagnosis of certain disorders of digestion. In this paper, normal physiology together with a reference to the eructation of ruminal gases and bloat will be considered; in a second paper the application of these methods to the diagnosis of traumatic reticulitis will be discussed.

Personal Observations on Reticulo-ruminal Motility

Methods

The following study has been completed up to date. (March, 1955).

(a) *External examination* of motility in 400 normal adult cattle. The opportunity for these examinations was taken during the course of professional visits to sick animals or by special appointments made for this purpose. Animals were examined at various times of the year, the diet being either hay, kale, silage, new leys, concentrates or a combination of some of these foodstuffs. The 400 cattle were made up of approximately 85 per cent. British Friesians, 10 per cent. Dairy Shorthorns, and the remainder cross-bred animals.

It will be recalled that motility of the dorsal ruminal sac can be palpated at the left sublumbar triangle or fossa, *i.e.*, the area surrounded anteriorly by the last rib, dorsally by the transverse processes of the lumbar vertebrae and posteriorly by the tuber coxae or " hook bone " and the thigh.

By placing the palm of the hand on this area, the dorsal ruminal sac when in a state of contraction, may be felt moving upwards to meet the hand, from which it is separated only by skin, muscles and peritoneum at this point. This is followed by relaxation, when the receding of the organ may be felt.

In order to correlate the motility of the rumen with that of the reticulum, a combined system of examination by auscultation and palpation was adopted as shown in the photograph.

Careful examination over a wide area revealed that these sounds are best heard at the ventral aspect of the seventh rib on the left side, *i.e.*, at its costo-chondral junction. In the average sized dairy cow, this point is roughly a handsbreadth in front of the milk well (the point where the milk vein disappears into the abdominal musculature) and in line with the direction of the vein.

(b) *Internal examination* by visual inspection and manual exploration *via* a ruminal incision during rumenotomy for:—

Sixty-four cases of traumatic reticulitis and three cases of exploratory laparotomy.

Two cases of frothy bloat which failed to respond to treatment with silicone anti-foaming agents and had to be relieved by rumenotomy. Since both cases did not call for an *urgent* evacuation of the ruminal contents, an opportunity was taken to explore the conditions prevailing in the reticulo-ruminal sac by inserting the arm through the ruminal incision and sealing off the opening with cotton-wool packed around the base of the arm.

(c) *Visual inspection* and manual exploration in one animal with a ruminal fistula following rumenotomy.

Observations in this case were made at various times of the day for a period of a few weeks.

Results

External examination

Personal experience revealed that in spite of very

Photograph illustrating the combined method of reticular auscultation and palpation of the rumen.

* A revised version of the R.C.V.S. Fellowship thesis as presented to a quarterly meeting of the South Wales Division at Saundersfoot on June 3rd, 1955.

careful auscultation by a special type stethoscope, reticular sounds are often very difficult to interpret, and may only be recognised after considerable practice. This was particularly noticeable in very fat animals, whilst lean, flat-chested ones revealed the sounds much more clearly.

From the survey, it was concluded that reticular sounds could be recognised as being of two types. When this organ contracts, liquid ingesta are forced over the reticulo-ruminal fold into the anterior dorsal ruminal sac, causing the primary sounds which may be likened to " mild swishing," the sounds lasting for a period of two to three seconds. These are followed by the secondary sounds which are similar to those described by Phillipson (1946) as " the unmistakable sounds due to the movement of liquid," and are caused by the ingesta flowing back into the reticulum as the latter relaxes and as the dorsal ruminal sac reaches its maximum contraction as palpated at the left flank.

By means of the combined method of examination described earlier, it was found that the cycle started with the contraction of the reticulum which was identified by the primary sounds described above. After an interval of two to three seconds, the dorsal ruminal sac was felt reaching its maximum contraction at the left sublumbar triangle, followed by its relaxation. After a pause of about 30 seconds, the dorsal ruminal sac could be felt contracting again, but no reticular sounds could be identified.

Relaxation of the dorsal sac completed the cycle; after a slight pause (30 to 40 seconds), the next cycle could be observed.

The contractions of the rumen which coincide with those of the reticulum are known as the primary ruminal contractions, whilst those which occur independently of reticular contractions are known as the extra-ruminal contractions. It was concluded that, by palpating the movements of the rumen at the left flank, it was impossible to detect any difference in the wave of motility involved in the two types, *i.e.*, it was impossible to ascertain whether the contractions commenced at the anterior or the posterior ruminal regions. In both types, the dorsal sac, when contracting, came upwards to meet the palm of the hand and then receded when relaxing. However, a significant factor discovered was that each extra-ruminal contraction was accompanied by eructation of gases from the rumen (commonly referred to as belching), whereas the primary ruminal contractions were not associated with eructation and could be identified as such clinically.

The above cycle of events was found to be remarkably constant in the large majority of the 400 normal adult cattle examined in the survey. However, variations in rhythm were found to occur, the total findings being as follows:—

In 295 animals (73.7 per cent.), a 1 : 1 rhythm occurred, *i.e.*, each primary reticulo-ruminal contraction was followed by an extra-ruminal contraction.

In 64 animals (16 per cent.), a 2 : 1 rhythm occurred, *i.e.*, two primary contractions preceded each extra-ruminal contraction.

In 41 animals (10.3 per cent.), a 1 : 2 rhythm was noted, *i.e.*, each primary contraction being followed by two successive extra-ruminal contractions.

An attempt was made to correlate the differences in rhythm in the various animals with a particular diet or with a degree of fullness of the rumen (observed at the left flank).

The only conclusions made were that the 2 : 1 rhythm was noted mostly in animals with comparatively empty stomachs, and in such animals the act of eructation of gases was often accompanied by contraction of the abdominal musculature. It was noted that animals in the same herd and on the same diet showed variations in rhythm.

Internal examination

Before dealing with the author's findings by internal exploration, it should be noted that time relations are usually upset for a while after opening the rumen, but these were found to recover after a short lapse of time in most of the animals examined. Schalk & Amadon (1928) stated that " careful and deliberate palpation of the rumen and reticulum does not alter the motility of these parts."

In the case of the animals examined during rumenotomy it was found that the contents of the dorsal ruminal sac were of a relatively solid nature, whilst the ventral sac was filled with semi-liquid material. The reticular contents were of a similar semi-liquid nature. In the two cases of frothy bloat, however, the contents of the reticulum, dorsal and ventral ruminal sacs were of the same frothy nature.

By palpation with the hand in the reticulum and with the forearm resting on the transverse fold, it was found that the cycle of motility started with the contraction of the reticulum. It occurred in a two-stage movement—the first was the weaker during which the reticulum was reduced to about half its static size. After a slight pause and without any relaxation, the second stage occurred and was marked by a forceful contraction, during which the reticulo-ruminal fold was drawn towards the median plane; the cardia was drawn downwards and the floor of the reticulum pulled upwards briskly, forcing liquid ingesta over the reticulo-ruminal fold into the anterior ruminal sac. The reticulum then relaxed. The second stage of this contraction was accompanied by the commencement of the primary ruminal contraction which, as far as could be determined by palpation, started at the transverse fold, spreading backwards briskly along the pillars until the whole dorsal sac was involved, the contraction being total in nature as distinct from peristaltic. The latter then relaxed accompanied by a contraction of the ventral sac followed by its relaxation. (The author was particularly impressed by the extreme turgidity of the transverse fold when in a state of contraction).

After a slight pause, the dorsal sac commenced another contraction which again started at the transverse fold, and proceeded backwards as before, followed by relaxation. During the whole period of this contraction the reticulum remained static. (It should be pointed out that in all the animals examined internally, a 1 : 1 rhythm of motility was recorded).

It will be recalled that by external examination it was established that these extra-ruminal contractions were accompanied by eructation of ruminal gases. This factor was again corroborated, but with the following reservations:—

(a) The extra-ruminal contractions occurred regularly in the presence of a ruminal incision or fistula.

(b) In these animals, eructation of gases did not accompany every extra-ruminal contraction. This was due to the fact that in such cases the gases escaped *via* the ruminal fistula. However, by sealing off the ruminal opening with cotton-wool, eructation accompanied every extra-ruminal contraction. In the animal with a fistula following rumenotomy, observations could be made at various times of the day for a few weeks. In this cow, ruminal gases usually escaped *via* the fistula but at certain periods, especially after a meal, the fistula was sealed off by the rising ingesta during extra-ruminal contractions and at such times eructation occurred.

(c) In the two cases of frothy bloat examined, it was observed that the primary reticulo-ruminal contractions occurred regularly, on an average of once every 65 seconds. The writer was particularly impressed by the strength of these contractions, indicated by the force of the flow of its contents over the reticulo-ruminal fold.

A striking feature noted in both cases was that the extra-ruminal contractions were absent.

External examination of these animals a few days after rumenotomy revealed the extra-ruminal contractions to be occurring regularly, each accompanied by eructation, a 1 : 1 rhythm being noted in both animals.

The following facts were also established by internal exploration of the various animals:—

The cardia was normally closed and slit-like, except during swallowing, regurgitation and eructation.

The cardia region was flushed with ingesta during each reticulo-ruminal contraction whilst it was pulled upwards and became widely dilated and funnel-like above the level of the stomach contents during eructation. The reticulum and reticulo-ruminal fold remained static during this period.

The opening of the cardia was executed by contraction of the dorsal rumen starting at the transverse fold by which the cardia is connected by muscular folds along the dorso medial ruminal wall.

Gentle massage of the stomach wall in the region of the reticulo-ruminal fold initiated regurgitation in some animals, this act being immediately preceded by an extra-reticular contraction. Ruminated material was returned to the anterior dorsal ruminal sac.

The oesophageal groove played no part in deglutition, regurgitation or eructation.

Discussion

By a combined method of auscultation and palpation, corroborated by internal exploration, it has been shown that the movements of the rumen may be correlated with those of the reticulum. Identification of reticular sounds is possible in most animals though with a varying degree of clarity. Wester (1926) denied the possibility of direct auscultation of these sounds but considered that "the frequency of its action could be determined by indirect methods, as under normal conditions, we are entitled to suppose that from six to eight seconds before the return contraction of the rumen, there must have been a contraction of the reticulum" (cited by Lagerlof, 1929). Lagerlof described the sounds as "chafing sounds" which could be auscultated at the ventral aspect of the seventh rib; the present work substantiated the latter author's findings whilst it is also submitted that the sounds may be distinguished as being of two types corresponding to reticular contraction and relaxation.

From the clinical point of view it is important to note that ruminal movements are of two types:—

(a) A primary ruminal contraction which immediately follows a contraction of the reticulum, the latter relaxing as the dorsal ruminal sac reaches its maximum contraction as palpated or observed at the left sublumbar fossa.

(b) An independent contraction of the rumen—the extra-ruminal contraction—which is always accompanied by eructation of ruminal gases: the reticulum remaining relaxed.

In a large majority of the animals examined, each primary contraction was followed by an extra-ruminal contraction. Variations were found in others, *i.e.*, 2 : 1 or 1 : 2 rhythm. It was observed that motility was accelerated during and shortly after a meal.

Reference to the available literature revealed that it is generally agreed that gases are expelled from the rumen for the most part by eructation. Cole, *et al.* (1945), referred to Wild's study of the frequency of eructation under a variety of conditions in cattle, sheep and goats, from which he concluded that "eructation is a normal and absolutely necessary process in ruminants." The same authors cited Amadon & Detweiler as having palpated the cardia *via* a ruminal fistula and found it to be widely dilated at the moment of eructation, assuming a funnel-like appearance; they concluded that such action involved muscular contraction.

Wester (1926) noted that eructation did not occur during every ruminal contraction and that it could occur in the presence of a ruminal fistula from which he concluded that increased ruminal pressure is not essential for eructation.

Hoflund (1940) also observed that eructation occurred during ruminal contraction and that the eructation contractions became irregular and less frequent on starvation but during active fermentation, after feeding, they became regular with extra contractions at intervals.

More recently Weiss (1953) published his findings in an extensive study of eructation in ruminants, mostly sheep. He concluded that eructation was directly associated with independent contractions of the rumen which started at the posterior dorsal ruminal sac, moving forward and thereby pressing the ruminal gases forward and downward to the cardia, the latter being clear of ingesta because the reticulum remained relaxed.

The present writer is in complete agreement with Weiss's findings that eructation is connected with

independent ruminal contractions (which Weiss referred to as eructation contractions) and that variations in rhythm occur. However, the same author's claim that these contractions start at the *posterior* dorsal sac cannot be accepted. Reference to his original work showed that in his investigations, two flexible tubes with balloons attached to the ends were inserted through two holes in a pressure stopper sealing the ruminal fistula; one balloon was directed to the region of the cardia and the other to the posterior part of the dorsal sac, each balloon being connected to a recording tambour. Air was introduced into the rumen at the rate of one litre per three minutes through a gas inlet passed through a third opening in the fistula stopper, in order to be able to recognise the ruminal contraction at which eructation occurs. This could be identified readily as a marked drop in intra-ruminal pressure coinciding with a specific ruminal contraction. By observing the time at which the anterior balloon responded to pressure changes in relation to the response of the posterior balloon, it was found that, with the primary ruminal contractions, the anterior balloon responded before the posterior one, but with the eructation contractions (extra-ruminal) the posterior balloon responded before the anterior one. Weiss therefore concluded that the eructation moves from behind forwards, stimulated by gas pressure in the posterior dorsal ruminal sac.

These conclusions have not been corroborated in the present survey. The writer has recently had an opportunity of studying the movements of the solid ruminal ingesta through a fistula over a period of several weeks. Using an electric torch it was observed that, corresponding to reticular contraction, the solid matter in the anterior dorsal sac was pushed upwards *slightly* followed by a slight pause, *i.e.*. the interval between the two stages of the reticular contraction. After about two to three seconds the solid mass was pushed upwards briskly filling the whole anterior region, followed almost immediately by an upward movement of the solid ingesta in the posterior region, the two portions meeting at an imaginary line at the centre of the fistula, corresponding to the second stage of the reticular contraction superseded by the primary ruminal contraction.

As the dorsal sac relaxed the ingesta fell away from the fistula leaving an air space in the dorsal region. After a lapse of a few seconds, the solid mass in the posterior region was again pushed *upwards* whereas there was no movement in the anterior region. It was established by internal palpation that this upward movement of the solid ingesta in the posterior rumen was caused by a contraction of the transverse fold and the horizontal and dorsal coronary pillars which had the effect of constricting the cavity of the rumen, thus pushing the solid mass upwards and thereby moving the ruminal gases forward (or out through the fistula).

These findings explain the pressure response shown by the posterior balloon in Weiss's experiment. Further evidence in support of the present writer's view was obtained from the fact that palpation or observation at the left flank in the intact animal failed to reveal any difference between the two types of ruminal contraction (*i.e.*, in both types the dorsal sac came upwards to meet the hand) except that the extra ruminal contractions were accompanied by eructation.

In the same fistulated animal, it was observed that on some occasions, after a meal, the ingesta completely occluded the fistula during the extra-ruminal contraction and at such times, eructation occurred. At other times, when the stomach was comparatively empty, ruminal gases escaped *via* the fistula and eructation did not occur.

It may be deduced from these findings that gas pressure is not essential for the initiation of the extra-ruminal contractions and that eructation occurs as a result of gas pressure in the anterior dorsal sac or cardial region. It was also observed in this animal that variations in rhythm occurred for no apparent reason, *e.g.*, 1 : 2 : 1 : 1 : 2 : 2 : 1, etc.

The mechanism by which the cardia is opened is not yet understood, a factor acknowledged by Clark (1948)—cited by Weiss (1953).

Wester (1926) maintained that it depended on the strength of the transverse fold contraction whilst Weiss (1953) considered that the cardia is kept normally closed by pressure from the surrounding organs and that its opening brought about during eructation by contraction of the lateral and medial pillars of the reticulo-ruminal fold.

Prolonged palpation of the cardia region in the present survey failed to provide convincing information, though a possible explanation may be derived from the following findings:—

(a) The reticulum (and reticulo-ruminal fold) remained static during eructation.

(b) The slit-like cardia is connected to the transverse fold by muscular tissue, along the dorso-medial ruminal wall, which may be palpated as a narrow fold in the live animal.

(c) Contraction of the transverse fold was accompanied by a shortening of this fold thereby raising the cardia whilst simultaneous contractions of the dorsal sac musculature in this region had the effect of slightly opening the cardia.

It is suggested that eructation is then brought about by gas pressure in the " relaxed " cardial area acting as a stimulus, the same mechanism at this stage being brought into play as in regurgitation for rumination.

Correlated with the subject of eructation is the condition known as bloat, in which gases are retained in the rumen causing distension of this organ. Bloat may be identified as being of two types: ordinary bloat, in which free gas accumulates in the dorsal ruminal sac, and frothy bloat in which the contents of the reticulo-ruminal sac are churned up into a frothy or foamy consistency, the ruminal gases not being released.

Despite considerable study by workers in many parts of the world the cause of frothy bloat still remains a baffling problem. It is generally agreed, however, that bloat is probably due to the failure of the eructation mechanism and not to excessive gas formation (Cole, 1945).

The same author has shown that ruminants are capable of eructating volumes of gas artificially introduced into the rumen considerably in excess of those normally produced.

Observations on two cases of frothy bloat in the present survey revealed that the primary ruminal contractions occurred regularly whilst the extra-ruminal contractions were absent. It is appreciated

that definite conclusions cannot be reached from so few cases but the findings if corroborated in future work will answer a query by Cole (1945)—" In bloat, is there a lack of ruminal contractions or simply a lack of opening of the cardial orifice?" Since the extra-ruminal contractions were found to be absent, it may be assumed that in bloat there is an inhibition or paralysis of a possible centre governing these contractions.

Evans & Evans (1949) showed that one litre of clover juice (equivalent to about 5 lb. fresh clover) introduced directly into the rumen of a sheep, paralysed its movements immediately with death occurring two hours afterwards. The *post-mortem* findings were consistent with poisoning by hydrocyanic acid. It is presumed that in this experiment the two types of ruminal contractions were immediately paralysed. The same authors stated that " after the first 90 minutes no ruminal movements were recorded, towards the end they were reappearing spasmodically but with diminished force." No reference was indicated as to which type reappeared.

Future work must be directed towards establishing the stimulus for the extra-ruminal contractions; whether eructation is brought about by gas pressure in the anterior or posterior dorsal ruminal sac, bearing in mind the possible central control of these and other factors.

Summary

1. A combined method of auscultation and palpation is described for correlating the movements of the rumen and reticulum in adult cattle.

2. Two types of ruminal movements may be identified in normal cattle as follows:—

A primary contraction which immediately follows a two-stage contraction of the reticulum; the ruminal movement starting at the transverse fold.

An extra-ruminal contraction, which occurs independently of the reticulum, again starting at the transverse fold.

3. In a large majority of 400 animals examined, a 1 : 1 rhythm of motility was observed.

4. Variations in rhythm occurred in animals in the same herd and on the same diet.

5. Eructation of ruminal gases accompanies each extra-ruminal contraction in the intact normal animal.

6. The primary reticulo-ruminal contractions are not associated with eructation, and may be identified as such clinically.

7. The extra-ruminal contractions can occur in the presence of a ruminal fistula. In such cases, eructation only takes place if the fistula is sealed.

8. It is suggested that gas pressure is not essential to initiate the extra-ruminal contractions but eructation depends on a stimulus by gas pressure in the anterior dorsal sac particularly the cardia region.

9. Eructation of ruminal gases is brought about probably as follows:—

The reticulum remaining relaxed, ruminal gases are moved into the cardia region by the independent ruminal contraction.

The cardia is raised and opened by the corresponding contraction of the transverse fold (by which it has direct muscular connection along the dorso medial ruminal wall) and the surrounding ruminal wall.

Gas pressure in the now " relaxed " cardia acts as a stimulus for eructation, the same mechanism being involved in the *final* stage as in regurgitation for rumination.

10. Observations on two cases of frothy bloat revealed the primary reticulo-ruminal movements occurring regularly; the extra-ruminal contractions being absent.

Acknowledgments.—The writer wishes to record his sincere thanks to the following:—

Dr. A. T. Phillipson, Rowett Research Institute; for his valuable assistance in revising this section of the original thesis; Mr. E. T. Rees Evans, M.A., B.SC., M.R.C.V.S., now at Cambridge, for his constant interest and advice; Miss M. M. Raymer, Librarian, Royal College of Veterinary Surgeons, and her staff for their great assistance in obtaining the available literature and Mr. E. C. Davies for the translation of Wester's original work

References

COLE, H. H., HUFFMAN, C. F., KLEIBER, MAX, OLSON, T. M., & SCHALK, A. F. (1945). "A review of Bloat in Ruminants." Fourth Report of the Committee on Animal Health of the National Research Council.

EVANS, W. C., & EVANS, E. T. R. (1949). Relation of a clover juice factor causing paralysis of smooth muscle to bloat in ruminants." *Nature.* **163.** 373.

HOFLUND, S. (1940). *Svensk. Vet. Tidskr.* **45.** Sup. No. 15. 322.

LAGERLOF. (1929). *Skandinavisk. Veterinar—Tidskrift.* **19.** 253–365.

PHILLIPSON, A. T. (1939). *Quart. J. Exp. Physiol.* **29.** 395–415.

———. (1946). *Vet. Rec.* **58.** 81–84.

SCHALK, A. F., & AMADON, R. S. (1928). *North Dakota Agr. Exp. Station Bull.* **216** 1–64.

WEISS, K. E. (1953). *Onderstepoort J.* **26.** No. 2. 241–250 ; 251–283.

WESTER, J. (1926). "Die Physiologie u. Pathologie der Vormagen Beim Rinde." (R. SCHOETZE, Berlin.)

ALLEGED OFFER TO PURCHASE SLAUGHTERED POULTRY

Reports have recently appeared of an alleged attempt to purchase poultry carcases slaughtered on account of fowl pest on a Buckinghamshire farm.

Enquiries into this case are still continuing but the Ministry of Agriculture points out that it is an offence for the carcases of birds killed on account of fowl pest to be removed from an infected place. Moreover, the entry of unauthorised persons on to farms where the disease has been confirmed is strictly forbidden while the farm is under restrictions. These precautions are necessary to prevent the possible spread of infection and penalties may be imposed for infringements.

Carcases of poultry slaughtered because of this disease, if not burned, are normally sprayed with disinfectant and buried under the supervision of the Ministry's veterinary officers.

News and Comment

ELECTION OF MEMBERS OF COUNCIL
R.C.V.S.

Four present members of Council will retire at the Annual General Meeting in 1956 and are eligible for re-election, namely: G. N. Gould, Esq., R. H. Smythe, Esq., H. Sumner, Esq., and Professor G. H. Wooldridge. The fifth vacancy arises from the death of Capt. J. R. Barker, who was due to retire in 1956.

Nominations of members of the Royal College for election to the Council must be submitted in writing on a form which may be obtained from the Registrar, and which must be returned to him duly completed before January 31st, 1956.

Each such nomination form must bear the signature of the proposer and seconder, who must not be present members of Council, and must be countersigned by the nominee.

THE PROFESSION AND THE PRESS

While those who are concerned with the public relations work of the Association welcome the expressions of opinion currently published in our correspondence columns, it may be helpful, in keeping this matter in perspective, to have regard to the work which is already accomplished in this field. For example, in its report to the last meeting of Council, the Parliamentary and Public Relations Committee noted the following:—

A considerable amount of publicity material, including abstracts of those (Congress) papers most likely to interest the press, had been prepared and the results were satisfactory. The lay press had published some 1,600 column inches of editorial matter, the largest amount recorded since he (the Press Officer) had taken office. Translated into terms of advertisement, the press had given free publicity to the value at least of £20,000. The President's speech had contributed substantially to the quantity of publicity obtained.

The farming press had, additionally, devoted considerable space, as had such journals as *The Field* and *Country Life*. Several broadcasts had been made from the Northern Ireland station of the B.B.C.

Criticism is welcome and stimulating; but, as a letter published this week from the Chief Secretary of the R.S.P.C.A. shows, the picture is not wholly dark.

UNIVERSITY NEWS

London

B.Sc. (Veterinary Science) October, 1955, Pass List, Royal Veterinary College

Bedson, Ivan Francis; Derbyshire, John Brian; Dier, Basil George Fielden; Ward, Anthony.

Part I only

Bowles, Jeffrey; Hudson, John Robert.

Part II only

Gray, John.

V.V.B.F. COUNTY OF AYR LADIES' GUILD

A highly successful dance was held in Western House, Ayr, on November 17th. There was a company of over 200 including local farmers, representatives of several drug firms, members of the local Division and their friends. The University of Glasgow Veterinary School was well represented and colleagues came from as far afield as Stirlingshire and Sussex. A tombola, run for the first time this year, proved to be most popular and thanks are due to the ladies for collecting the prizes which were all donated. It is hoped that the sum of approximately £120 will have been realised.

IN PARLIAMENT

Slaughterhouses

Mr. Willey asked the Minister of Agriculture, Fisheries and Food what action he has taken to implement the recommendations of the Interdepartmental Committee on Slaughterhouses in England and Wales.

Mr. Amory: I have not yet reached decisions on the Committee's recommendations.

Mr. Willey: Will the right hon. Gentleman bestir himself on this question? Far more slaughterhouses were opened than ever we expected and his predecessors predicted, and the sooner something is done the better, as conditions in many of the slaughterhouses are most disturbing.

Mr. Amory: I entirely agree that it is a job which has to be done, but I received the Report only at the end of July. I at once entered into consultations with all the local authorities and other interests concerned. The advice that I have had—perhaps not surprisingly—is far from unanimous, and I must enter into further consultations before taking any steps in this very important matter.

Mr. Baldwin: Is my right hon. Friend aware that there is no need to restrict the erection of slaughterhouses so long as they comply with the sanitary requirements of the district concerned, and that if someone builds a slaughterhouse where it is not wanted that is his loss and not a loss to the State?

Mr. Amory: I will certainly take into account the views of my hon. Friend.

Mr. Royle: In view of the fact that there is completely inadequate inspection, is it not absolutely necessary to get on with the building of some decent slaughterhouses and to close these hole-and-corner places?

Mr. Amory: I do not dissent from what the hon. Member has said. I am very anxious to improve the inspection.

Fowl Pest

Sir L. Ropner asked the Minister of Agriculture, Fisheries and Food how many outbreaks of fowl pest occurred during the first 10 months of 1954 and for the same period of 1955.

Mr. Amory: During the 10 months to October 31st, 1954, 630 outbreaks of fowl pest were confirmed in England and Wales. The corresponding figure for 1955 is 465.

Mr. Dye asked the Minister of Agriculture, Fisheries and Food how long after the first outbreak of fowl pest in Norfolk in 1955 were effective measures of control over the movement of poultry established in the neighbourhood.

Mr. Amory: Confirmed outbreaks of fowl pest are immediately followed by local restrictions on movement. Standstill restrictions over a wider area such as those now operating in Norfolk are imposed as soon as my veterinary advisers consider that they are needed to prevent further spread of disease. It is not possible, however, to relate such restrictions to any particular outbreak.

Mr. Dye: Is the Minister aware that his chief veterinary officer in Norfolk has recently stated that he is not getting the co-operation essential for effective control in relation to this infectious disease? Does the right hon. Gentleman not think that the time has come, if we are to stamp out the disease, when we must take action as effective and ruthless as that in dealing with foot-and-mouth disease among cattle?

Mr. Amory: I shall certainly not shy away from any steps that I am advised are technically sound to deal with this disease, but we must remember that a single local outbreak is dealt with first by local steps. As soon as the position looks like being serious enough to warrant it a standstill order is imposed.

Mr. Dye: When it is too late.

Sheep (Scrapie)

Mr. Crouch asked the Minister of Agriculture, Fisheries and Food when the last outbreak of scrapie disease in sheep occurred in England, Wales or Scotland.

Mr. Amory: Scrapie has existed among sheep in Great Britain for many years, but it is not a notifiable disease and I have no records of individual outbreaks.

Mr. Crouch: Will my right hon. Friend consider making this a notifiable disease under the Diseases of Animals Act, not in order to adopt a slaughter policy, but in an endeavour to get rid of this disease, in view of the fact that it is affecting our export of sheep to Australia and New Zealand in particular?

Mr. Amory: I agree with my hon. Friend that this disease is a real nuisance. One trouble is that it is at present very difficult to diagnose it. The Agricultural Research Council is intensifying its research into the whole problem of scrapie.

FOOT-AND-MOUTH DISEASE

The area described below is declared, as from November 24th, to be an Infected Area for the purpose of preventing the spreading of foot-and-mouth disease, and the provisions of the Foot-and-Mouth Disease (Infected Areas Restrictions) Order of 1938 (b) are applicable to and have effect within the area. It comprises the City and County Borough of Coventry, and then as follows:—

In the County of Northampton, Petty Sessional Division of Daventry, the parish of Barby.

In the County of Warwick, the boroughs of Royal Leamington Spa, Rugby and Warwick, and the Petty Sessional Division of Kenilworth.

Petty Sessional Division of Warwick, the parishes of Honiley, Haseley, Beausale, Budbrooke, Hatton, Sherbourne, Barford, Bishop's Tachbrook, Newbold Pacey and so much of the parish of Wasperton as lies to the east of the road A.429 running from Warwick to Wellesbourne Mountford including the said road.

Petty Sessional Division of Kineton, the parishes of Lighthorne and Chesterton and Kingston.

Petty Sessional Division of Southam, the parishes of Marton, Long Itchington, Ufton, Harbury, Bishop's Itchington, Birdingbury, Stockton, Southam, Ladbroke, Chapel Ascote, Watergall, Wills Pastures, Hodnell, Lower Radbourn, Upper Radbourn, Priors Hardwick, Priors Marston, Napton on the Hill, Leamington Hastings, Grandborough, Lower Shuckburgh, Upper Shuckburgh and Wolfhampcote.

Petty Sessional Division of Rugby, the parishes of Willoughby, Dunchurch, Thurlaston, Bourton on Dunsmore, Frankton, Princethorpe, Stretton on Dunsmore, Ryton on Dunsmore, Wolston, Church Lawford, Long Lawford, Little Lawford, Brandon and Bretford, Binley, Brinklow, Combe Fields, Stretton under Fosse, Kings Newnham, Easenhall, Pailton, Harborough Magna, Cosford and so much of the parishes of Monks Kirby, Churchover, Newton and Biggin and Clifton upon Dunsmore as lie to the west of the road A.5, excluding the said road.

Petty Sessional Division of Coleshill, the parishes of Allesley and Keresley.

Petty Sessional Division of Nuneaton, the parishes of Bedworth, Shilton, Ansty and Withybrook.

FOOD HYGIENE

Professor H. Burrow, Professor of Medicine, Royal Veterinary College, has been elected deputy chairman of the Royal Society of Health standing committee on the hygiene of food and food equipment.

FOWL PEST

In view of the occurrence of numerous outbreaks of disease at places outside the present scheduled area of central Lancashire it has been decided to extend that area. Accordingly the Minister has made The Live Poultry (Mid-Lancashire) (Amendment) Order, 1955, which came into operation on Monday, November 28th, and which substitutes the area specified below for that formerly described.

The area comprises:— The Administrative County of Lancaster (excluding the Petty Sessional Divisions of Hawkshead and North Lonsdale). The cities and county boroughs of Liverpool, Manchester and Sal-

ford. The county boroughs of Blackburn, Blackpool, Bolton, Bootle, Burnley, Bury, Oldham, Preston, Rochdale, St. Helens, Southport, Warrington and Wigan.

PERSONAL

Births

JULL.—On November 19th, 1955, to José (*neé* Bligh), wife of David Jull, B.SC., M.R.C.V.S., at Whangarei Hospital, Northland, New Zealand, a daughter, Carolyn Mary.

SCURFIELD.—On November 24th, 1955, to Jennifer (*née* Rackham), M.R.C.V.S., and Robert Scurfield, of Heather View, Etching Hill, Rugeley, a son.

Marriage

MCNICOL—CLARK.—At Branston Parish Church, Lincoln, on November 11th, 1955, Ogilvie Duncan, M.R.C.V.S., Hainton House, Branston, Lincoln, son of the late Duncan and of Mrs. Ina McNicol, 58, Allardice Street, Stonehaven, to Anne, daughter of Mr. and Mrs. R. Clark, Houghton-le-Spring, County Durham.

COMING EVENTS

December

5th (Mon.). Annual Dinner of the Centaur Society, University of Bristol, at the Hawthorn's Hotel, Bristol, 7 p.m.

6th (Tues.). General Meeting of the East Midlands Division, B.V.A., at the School of Agriculture, Sutton Bonington, 2.15 p.m.

8th (Thurs.). Annual Joint Meeting of the Sussex Veterinary Division, B.V.A., and the Brighton and Mid-Sussex Division, B.M.A., in the Hotel Metropole, Brighton, 6.30 p.m.

9th (Fri.). Dinner and Dance of the North Wales Division, B.V.A., in the Imperial Hotel, Llandudno, 7 p.m.

14th (Wed.). Special Laboratory Meeting of the Section of Comparative Medicine, R.S.M., at the Royal Veterinary College, Royal College Street, Mornington Crescent, N.W.1, 4.30 p.m.

29th (Thurs.). Annual Dance of the V.V.B.F. Ladies' Guild, Dumfries and Galloway Division, in the Cairndale Hotel, Dumfries.

January, 1956

6th (Fri.). Annual Dinner and Dance of the North Wales Division, B.V.A., in the Imperial Hotel, Llandudno, 7 p.m.

18th, 19th, and 20th (Wed., Thurs., and Fri.). B.V.A. Council and Committee Meetings in London.

R.C.V.S. EXAMINATIONS

December 8th, Thursday.—M.R.C.V.S. Written Examinations.

December 9th, Friday.—M.R.C.V.S. Written Examinations.

December 12th, Monday.—M.R.C.V.S. Practical and Orals commence (Panels "A" and "B").

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Ayr. Barr Mill, Galston (Nov. 28).

Anglesey. Minafon Farm, Brynteg (Nov. 24).

Caernarvon. Pant Glas, Pentrevollas Road, Bettws-y-Coed (Nov. 28).

Ches. Bent End Farm, Heaton, Rushton, Macclesfield (Nov. 22); Blackers Hall Farm, Mottram St. Andrew, Macclesfield (Nov 23); Brookside Farm, Altrincham (Nov. 28).

Denbigh. Bryn Tan, Gwytherin, Abergele (Nov. 28).

Derby. Greenfields Farm, Alport, Bakewell (Nov. 22); Newlands Farm, Hatton Fields, Hilton (Nov. 26); Hill Top Farm, Heathcote, Hartington, Buxton (Nov. 28).

Essex. 57, Sheepen Road, Colchester (Nov. 26).

Salop. Bostock Hall, Whixall, Whitchurch (Nov. 28).

Staffs. Hall Croft, Marchington, Uttoxeter (Nov. 22); Pool House Farm, Tittensor, Stoke on Trent (Nov. 23); Birks Farm, Stretton (Nov. 24).

Yorks. Park House Farm, Ampleforth (Nov. 22); Sea View Smallholding, High Normanby, Robin Hood's Bay, Whitby (Nov. 24); Otterburn House Farm, Bell Busk, Skipton (Nov. 28).

Foot-and-Mouth Disease

Warwicks. Harpitts Fields, Princethorpe (Nov. 24).

Fowl Pest

Essex. Beckers Green Poultry Farm, Cressing Road, Braintree; 270, Cressing Road, Braintree (Nov. 22); Straits Mill Farm, Brocking (Nov. 24); Matlock, Menerden Road, Wickford (Nov. 25); Highfield Stile, Broad Road, Bocking, Braintree (Nov. 26).

Herts. 23, High Street, Tring (Nov 22); 24, High Street, Tring (Nov 25).

Lancs. New House Farm, Chapel Lane, Longton, Preston (Nov. 22); 168, Lytham Road, Preston; Aldersfield, Clifton Lane, Clifton; Gilberton Farm, Abbeystead, Lancaster; Greenside Farm, Abbeystead; Castle View, Bonds, Garstang, Preston; 2, Green Lane, Garstang and The Orchard, Moss Lane, Garstang, Preston; 7, Wyresdale Cresent, Scorton; Scorton Café, Scorton, Preston; Kiln Farm, Lees, Oldham; Victory Corn Stores, 25-27, Huddersfield Road, Oldham; Newlands, Ratten Lane, Hutton; Shoreside Farm, Hesketh Bank, Preston; Willow Bank, Stalmine, Fleetwood; Bunkers Hill, Tedder Lane, Hambleton, Blackpool (Nov. 23); Lisieux, White House Lane, Langho, Blackburn; The Bungalow, Moss Lane, Little Hoole, Preston; Higher Moorhead Farm, Quernmore, Lancaster; Higher Crook Hey Farm, Cockerham, Lancaster; Wharfe Cottage, Winmarleigh,

Preston; Lee House, Lee Road, Marton, Blackpool (Nov. 24); Spen Farm, Clifton Road, Marton, Blackpool; 63, Whelstone Hill Lane, Derker, Oldham (Nov. 25); 170, Lytham Road, Preston; Higher Park Farm, Pleasington, Blackburn; Sunnymeade, Chapel Lane, Longton, Preston (Nov. 26); Barnfield, Liverpool Road, Hutton, Preston; High Fell Gate, Grange-over-Sands; Threlfall Farm, Winmarleigh, Preston (Nov. 27); Marholes Farm, Cabus, Garstang (Nov. 28).

Middx. 73, Breakspear Road, Ruislip (Nov. 26); Model Pig Farm, Ladygate Lane, Ruislip (Nov. 27).

Norfolk. Home Farm, Downham Market (Nov. 22); The Thatch, Blofield Corner, Blofield, Norwich (Nov. 24); Neaton Poultry Farm, Framlingham Earl, Norwich (Nov. 25); Chapel Lane, Foulsham, East Dereham; Cherrytree Farm, Lyng, Norwich; Pockthorpe, Foulsham, East Dereham; Station Road, Foulsham, East Dereham; Home Farm, Barnham Broom, Norwich (Nov. 26).

Suffolk. Hillside, Lound, Lowestoft (Nov. 22).

Sussex. Woodbine Poultry Farm, Cross-in-Hand, Heathfield; New Pond Farm, Cross-in-Hand, Heathfield (Nov. 22).

Yorks. Lydgate Farm, Springhead (Nov. 25); Grotton Farm, Grotton; Ashes Lane, Off Station Street, Springhead (Nov. 26).

Swine Fever

Bucks. Horme Farm, Northall, Dunstable (Nov. 24).

Devon. Aller Farm, Awliscombe, Honiton (Nov. 24).

Dorset. Tripps Farm, Purse Caundle, Sherborne (Nov. 24); Little Monkwood Hill Farm, Plush, Piddletrenthide, Dorchester (Nov. 26).

Essex. Little Bullocks Farm, Takeley, Bishops Stortford (Nov. 25).

Hants. Crookhill Poultry Farm, Romsey (Nov. 28).

Herts. Longacre, Long Lane, Bovingdon, Hemel Hempstead (Nov. 24).

Lanarks. Blantyre Braes, Blantyre, Glasgow; Cormiston Farm, Biggar (Nov. 24); Fernieshaw Farm, Cleland, Motherwell; Neilian Piggery, Modiesburn (Nov. 28).

Lancs. Poplars Farm, Lydiate Lane, Sefton, Liverpool, 23 (Nov. 28).

Lincs. Swallow Hill Buildings, Thurlby, Bourne (Nov. 28).

Norfolk. Hoe Farm, Clenchwarton, Kings Lynn (Nov. 24); Curtis Field, Highgate, Kings Lynn (Nov. 26).

Northumberland. Cheviot View, North Avenue, Westerhope, Newcastle upon Tyne, 5 (Nov. 23).

Notts. 18, Strawberry Road, Retford (Nov. 26).

Oxford. Callows Farm, Stonesfield (Nov. 24).

Rutland. Tickencote Lodge Farm, Empingham, Oakham (Nov. 22).

Salop. Ackleton Hall Farm, Bridgnorth (Nov. 24); Cinder Hall, Cleobury North, Bridgnorth (Nov. 28).

Staffs. The Brund, Sheen (Nov. 24).

Suffolk. Hill Farm, Saxmundham (Nov. 24); Hamilton House, Great Glemham, Saxmundham (Nov. 25).

Westmorland. Station Farm, Milnthorpe (Nov. 23).

Wilts. Ashbourne Pig Farm, Moot Lane, Downton, Salisbury (Nov. 25).

Yorks. Charity Garden Allotments, Canterbury Road, Goole (Nov. 24); Green View Farm, Brayton, Selby (Nov. 26).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

THE PROFESSION AND THE PRESS

Sir,—There is much in the letter from Mr. Mercer which you publish to-day which should make all those of us engaged in private agricultural practice think very seriously as to our present and future prospects. There is no doubt at all that farming is a less prosperous industry now than even two or three years ago—corn and sheep prices have fallen heavily this year, and the agricultural economists tell us that milk alone is continuing to show a level and satisfactory return. Of course, the best farmers continue to do well—some of them did even in the late '20s and early '30s. But what proportion of our clients fall into the "best" category? Like Mr. Mercer, I find that my charges (in spite of my assistant's constant importunity to charge more!) are about average: less than those obtaining in the Home Counties, but more than in the North and West. And yet, on abstracting my accounts over a period of 25 years, I find that, with only one or two exceptions, the annual net profit shown by my accountant approximates nearly to the sum paid me by the Ministry of Agriculture for my services as Local Veterinary Inspector.

If at all general (and there must be many others besides myself who are similarly situated, even if they have not yet realised it) this seems to me to disclose a very serious position. In order to make private agricultural practice an economic proposition without a Ministry of Agriculture appointment, charges for drugs, services and advice would have to be *at least* double what they are to-day. One can imagine the outcry from one's clients, from the N.F.U. and from the whole agricultural world if matters came to this pass. Private practice should, surely, if it is to continue as such, have the right to be self-supporting and not bolstered up by heavy subsidies from State funds. But it would seem that agricultural economics make it increasingly unlikely that private practice could exist without such subsidy. Much as I regret the conclusion (which in the long run is inescapable, though only younger members may live to see it) the continuance of the profession as a viable entity will depend on its full integration into a State service. The late Philip Snowden was, I fear, right when he spoke of "the inevitability of gradualness": for is not this itself Evolution?

Yours faithfully,

PAUL CROSFIELD.

Chipping Norton,
Oxon.

November 26th, 1955.

Sir,—At the request of several members of my Division, I raised the matter of the profession and the press at the last meeting of Council, B.V.A., with particular reference to ill-informed and grossly inaccurate statements in an agricultural weekly journal. As Council went into committee to discuss the matter, the bulk of the profession remains in ignorance of the action taken behind the scenes, and consequently is not in a position to approve or disapprove.

Like Mr. McGhee, I came away from the meeting of Council happy to know that the President had indeed handled the matter with superb diplomacy. I do not entirely agree, however, that this was an occasion for "hushing up." The veterinary profession tends to suffer from an inferiority complex, and it accepts apathetically a position as the baby sister of medicine and agriculture. Without developing an exaggerated idea of our importance, we badly need better publicity and public relations. The Officers of the Association are already overburdened with work, and surely the time has now come for appointment of a full-time public relations officer.

Yours faithfully,

R. I. MACRAE.
Hon. Secretary,
Lincolnshire and District Division.

83, Grantham Road,
Sleaford,
Lincolnshire.

November 27th, 1955.

Sir,—As someone outside the veterinary profession, I should like to say that I have always been impressed with the work of the Chairman and officers of the Publicity Committe of the B.V.A. No one could better have disseminated information concerning the deliberations of the Veterinary Congress than was done on the last occasion, judging by the bombardment of press calls I received, both at R.S.P.C.A. Headquarters and at my home.

I am greatly intrigued by Dr. Wooldridge's comment regarding the correspondence in *The Times*, instigated by the R.S.P.C.A., on the subject of cruelty to animals by children and I should be more than grateful if he could now enlighten me as to the views of the profession as a whole on that particular problem.

Yours faithfully,

A. W. MOSS.
Chief Secretary, R.S.P.C.A.

Royal Society for the Prevention
of Cruelty to Animals,
105, Jermyn Street,
London, S.W.1.

November 26th, 1955.

THE VALUE OF NITROFURAZONE AS A COCCIDIOSTATIC DRUG

Sir,—The paper you published on November 19th by Messrs. Davies and Kendall will be read with great interest by all who have used nitrofurazone successfully during the past few years as a means for controlling outbreaks of caecal coccidiosis in chickens. One assumes that this work was carried out with a view to helping the poultry industry, and not with any antipathy to the drug in question; that being so I would like to offer the following criticisms:—

1. It is difficult to follow the reasoning for the experiment being carried out in electrically heated wire-floored brooders when the subject was primarily related to the deep-litter system of poultry management.

2. Even if one accepts that the single inoculum technique for known numbers of infective oocysts is comparable to field infection—a statement with which I personally disagree most heartily—the authors give no indication as to the state of the digestive tract at such times. Were the chicks' crops full or empty? Were the birds given their oocysts in the early morning after a natural fast, or following feed, because the *p*H of the crop, gizzard and intestinal contents *may* play an important part in the development of coccidiosis? Earlier work has shown that the acidity of the caecal tubes can be changed by diet, and also that hydrochloric acid or lactic acids *appear* to assist in controlling outbreaks in the field. The physical state of the intestinal tract contents is equally important (*e.g.*, the therapeutic value of Epsom salts) and therefore this factor of hypertonic solutions may also affect the efficacy of the single inoculum technique.

3. Great play is made upon the death rate in these experiments, yet in the field we often find that the " depressed " state of survivors is of equal if not greater importance. Laboratory observations do *not* offer a close parallel with the conditions of an epidemic in the field. They cannot do so in wire floored brooders, and in this connection may I quote a typical example. A group of 500 three-week-old pullets is being reared on deep litter and one dies of acute, typical, caecal coccidiosis. The rest of the flock look quite well and eat normally; a few days later a second death follows, and perhaps on the next day there is another death. But of the remainder not very many look off colour, yet some of them are presumably ingesting small numbers of oocysts. How long will it be before the bulk of them have ingested sufficient to make them sufficiently seriously ill to be treated with a sulpha or nitro drug; or be immune? If one doses early, after the first death or two, fully 50 per cent. of the chicks may have no coccidia inside them (at the time of treatment) in which case the treatment is completely wasted. Does this state of affairs compare in any way with the experimental set-up of Davies & Kendall?

4. The work of Gardner & Farr is quoted showing that nitrofurazone at 0.0108 per cent. " gave only partial protection," but that is all the farmer expects —something which will *help* him; something which is cheap but useful; and I think that even Davies &

Kendall will agree that *partial* protection is much better than nothing.

Work at Weybridge is quoted showing that nitrofurazone is very much less effective than sulphamezathine, but who would expect a drug in the feed at a *preventive* level (0.01 per cent.) to be as good as another drug given at a *curative* level (0.2 per cent.). Furthermore, why use as a standard a drug given in the *drinking water*, against one given in the *feed*? In the paper under criticism these same conditions are again adopted (medicated water *versus* medicated feed) yet no data is given as to the quantities of water or feed ingested, or alternatively of blood levels of the drugs used. One has no proof that the chicks were in fact of normal bodyweight at the time of the experiment, or that they consumed sufficient feed to give them any worthwhile intake of nitrofurazone.

5. The general theme of the article is to the effect that nitrofurazone in the strengths commonly used in the feed is worthless, yet in Table I when the chicks were given 10,000 oocysts, nitrofurazone saved 65 per cent. of the chicks as against 5 per cent. of natural survivors. Is that not in itself proof that the drug does do quite a lot of good, and if used in this way will save the lives of many chicks? Doubtless Davies & Kendall will wish to retort that sodium sulphamezathine saved 95 per cent., not a mere 65 per cent., but this was when the drug was given 48 hours following infection and I would like to know how any farmers know when their chicks have been infected 48 hours. Nitrofurazone can be given safely for weeks on end, but try giving 0.2 per cent. sulphamezathine continuously in the drinking water for the same period and see the result! If the conditions described are not comparable why then test them out in the manner described?

6. "There is little critical evidence to indicate whether or not the drug (nitrofurazone) has a significant effect on the incidence of disease," state the authors; perhaps not, but whereas we know from a very wide field experience of chick and turkey rations medicated with nitrofurazone that we get *few* criticisms from chicken farmers about caecal coccidiosis, we get *many* complaints from those who rear turkey poults. So much so it is our belief that nitrofurazone (0.01 per cent.) is of little value in turkey starter rations, but is eminently suitable for table poultry rations. That may not be critical proof, but it is factual and practical, being based on the feeding of millions of chicks and about half a million poults.

7. Although Davies & Joyner showed earlier that the average number of oocysts per gramme of litter is frequently between 10,000 and 100,000, it must not be forgotten that quite a period is required to reach this build-up over all the pen, and it is presumably during this earlier period that nitrofurazone and any other drugs, which have a "preventive" or "mitigating" action, are effective. They are of less, or little, value once very high concentrations of oocysts can be demonstrated in all sections of the deep-litter compartment, hence the absolute necessity to combine good management with A.C. drugs in the feed.

Personally I would have thought that more benefit would have accrued to the poultry industry if trials had been carried out by Davies & Kendall with new medicaments such as oxyquinaldine or "Nicarbazin," rather than trying to disprove by laboratory experiments the value of a drug which has already been accepted by the industry as being valuable.

Yours faithfully,

W. P. BLOUNT.

2, Kingscote Street,
London, E.C.4.

November 22nd, 1955.

THE OPENING OF CONGRESS

Sir,—You have earned the gratitude of many of us by publishing the recent correspondence concerning the opening of the B.V.A. Congress.

If in supporting Mr. Halpin's suggestion concerning the opening of future B.V.A. Congresses I have used somewhat vehement language, then I am duly repentant. Anyone who has taken offence may charitably remember that the early Christians were apparently disliked by the Romans principally because of their bad manners! However, I still think that in the gloomy days which lie ahead a bit more of the spirit behind his proposal will be a great help.

Yours faithfully,

A. L. BONGARD.

Milk Marketing Board Centre,
Calthwaite,
Penrith,
Cumberland.

November 26th, 1955.

ELECTRICAL STUNNING AND HUMANE SLAUGHTERING OF ANIMALS

Sir,—I had no desire again to enter into prolonged correspondence on the humanity of Jewish ritual slaughter but I feel, in justice to Rabbi Sassoon, that I must conclude he is unaware that an investigation was undertaken some time ago at one of our University Veterinary Schools to ascertain the period which elapsed before loss of consciousness occurred in ritually slaughtered cattle.

The report of the investigation has not, to my knowledge, been made public and one must be excused if one concludes that this report was unfavourable to the arguments raised in support of the humanity of Jewish ritual slaughter.

I would also state that I entirely agree with the views expressed by Dr. Phyllis Croft and can only think that Rabbi Sassoon has chosen, and interpreted, his data to prove his case. I am ready to believe that this has been done unwittingly but it does not help his hypothesis in the mind of the reader who has knowledge of the subject.

Yours faithfully,

H. E. BYWATER.

Essex House,
High Street,
Stratford, E.15.

November 24th, 1955.

A NEW UROGRAPHIC CONTRAST MEDIUM

Sir,—I was interested to read a paper by Messrs. Harrod & Frost on Contrast Urography in the Dog in your issue of the 19th instant. As I have recently published some work on this subject (Collery, 1955) by a slightly simpler technique, the following points may be of interest to your readers:—

1. Using 50 per cent. Diaginol (M. & B.) without a compression band, my urographs were comparable in quality to those produced in your recent issue, although their reproduction in the published paper fell short of the original quality.

2. It was noteworthy that these plates of Messrs. Harrod & Frost give little indication of the condition and disposition of the ureters. In a paper published about a year ago Messrs. Drury *et al.* (1953) figure rather similar plates and point out that only one ureter is usually displayed in these, a finding which they suggest may be normal in the dog. In my paper referred to above, I gave certain reasons for doubting this statement. Since a compression band was used by both Drury *et al.* and Harrod & Frost, I suggest that this might be the cause of inadequate representation of the ureters in their plates.

3. Messrs. Harrod & Frost state that they exposed their plates at 25 kV 250 mA. I found 25-30 kV 60 mA adequate with an exposure of 0.5 sec. This increased exposure over their time is scarcely a disadvantage, since, like them, I found it necessary to use general anaesthesia. These figures may be of interest to those using relatively low-power X-ray apparatus.

Yours faithfully,

L. COLLERY.

Veterinary College of Ireland,
Ballsbridge,
Dublin.

November 22nd, 1955.

References

COLLERY, L. (1955). *Irish Vet. J.* **9.** No. 6.
DRURY, F., DYCE, K. M., & MERLEN, R. H. (1953). *Vet. Rec.* **65.** 647—8.

CEREBRO-SPINAL FLUID IN ENCEPHALITIS IN DOGS

Sir,—In his letter of October 18th Mr. Carter raises several interesting points regarding cerebro-spinal fluid in canine encephalitis. Our remarks made on the occasion of the Canine Virus Forum were based purely on clinical observation and were not backed by experimental data. Unfortunately, certain details of our statements were omitted and others incorrectly recorded at the time, which no doubt prompted Mr. Carter's comments.

One of us, J.K.B., asked the quorum if there was any knowledge of the effect of intracranial pressure in causing the symptoms of encephalitis and pointed out that often pain could be detected in the lumbar sacral space which appeared to be relieved by the withdrawal of c.s.f., not by lumbar puncture as is suggested in the recorded account, but from the cisterna magna. Approximately 14 ml. of c.s.f. is the total amount found in a normal greyhound and 10 ml. has been withdrawn without any apparent ill effect. However, it was not suggested that this should be a regular amount withdrawn in every case. In fact, J.K.B. is of the opinion that even puncture of the meninges may relieve pressure without actually withdrawing any fluid into the syringe.

With reference to the pressure of c.s.f., Teunissen & Verwer (1953) quote an average of 86.5 mm. water, although they report that 24 to 172 mm. have been observed as extreme values in the normal dog. The figures quoted by W.B.S. were assessed whilst in practice and the technique of pressure recording was incorporated with the withdrawal of c.s.f. as a therapeutic measure. It is now frankly admitted that these figures are not correct as the technique used has since proved to be unreliable.

The procedure of sub-occipital puncture of the cisterna magna is relatively easy as is the withdrawal of c.s.f. and the injection of therapeutic and myelographic agents, but to endeavour to assess pressure during the same operation is not without difficulty. Briefly we would say that there is clinical evidence that intracranial pressure is increased in cases of encephalitis. One of us, W.B.S., has found that the withdrawal of c.s.f. can improve the condition in certain cases, some of which have recovered completely, but has failed to produce improvement in others. Obviously, pressure is not the only factor to be considered, this no doubt being the result of brain tissue damage which in itself must be the all-important factor in cases exhibiting signs of encephalitis. In our opinion change of pressure does not produce evidence of pain and in fact repeated withdrawals have been made in normal dogs without untoward effect.

Unfortunately, if the procedure is to be conducted safely, general anaesthesia, using a short acting barbiturate, is essential, but as lasting improvement has only been obtained following repeated withdrawals, the frequent administration of a general anaesthetic to sick animals has obvious disadvantages. In the human, of course, only local anaesthesia is required and withdrawals of c.s.f. can be made by lumbar puncture, but this has not proved to be a practical procedure in our hands.

Yours faithfully,

J. K. BATEMAN.

Greyhound Racing Association Ltd.,
Northaw, Middlesex.

W. BRIAN SINGLETON.

Canine Research Station,
Animal Health Trust,
Kennett, Nr. Newmarket.

November 18th, 1955.

Reference

TEUNISSEN, G. H. B., & VERWER, M. A. J. (1953). *Proc. Int. Vet. Congress.*

LYMPHATIC LEUKOSIS IN THE PIG

Sir,—Mr. Pyke's article " A Case of Leukaemia in a Pig " (*Vet. Rec.*, **67,** 837) is a timely reproach to those of us who record our cases in silence and do not publish our records. In my opinion the term

" leukaemia " is best reserved for cases in which the number of circulating leukocytes is found to be abnormally high, " leukosis " being used in a broader sense to embrace all those cases in which the blood cell count is either not made or not found to be significantly altered. Mr. Pyke presents no evidence of an abnormally high lymphocyte count. Otherwise, the records of the Pathology Department at Weybridge support his opinion that the disease occurs more frequently than is suggested by published records. During the past four years alone we have diagnosed lymphatic leukosis nine times. As most of our material arrives in the form of morbid specimens, our records are often deficient in clinical and autopsical data. Nevertheless, a brief summary of our nine cases may be of value, in the light of Mr. Pyke's paper.

Case 1.

A four-month-old, Large White gilt was reported normal one day and found dead the next. The liver weighed 15½ lb. and was mottled and marbled in white; a portion of kidney sent was diffusely white and friable; a portion of mesentery was thickened and friable. All the sections examined were severely infiltrated with lymphocytes.

Case 2.

Sixteen-month-old Saddleback cross gilt. Persistent anorexia was the only symptom reported. The gilt was slaughtered and the complete pluck, spleen, pancreas, one kidney and various lymph nodes submitted for diagnosis. The lymphatic organs were solidly white; in the liver and kidney, infiltration was both diffuse and multinodular. Sections exhibited extensive lymphocytic infiltration of liver and kidney, hypertrophy of the peribronchial lymphatic tissue, and lymph nodes and spleen converted into solid masses of lymphocytes in which normal organic structure had disappeared. This was a typical lymphosarcoma. In view of perivascular accumulations of lymphocytes in the lungs and the high concentration of lymphocytes seen in blood vessels in the sections, we postulated haematogenous diffusion of the neoplasm and returned a diagnosis of lymphatic leukaemia.

Case 3.

Large Black sow. No history. The portions of lung, liver, spleen, kidney and iliac and sternal lymph nodes submitted, all exhibited severe, local and diffuse, lymphocytic infiltration.

Case 4.

A sow. According to the history received, this animal had gradually become emaciated during the previous three months, during which time the lymph nodes of the throat region became markedly enlarged. The tuberculin test was negative. Antibiotic (unspecified) and sulphamezathine therapy produced no improvement. The sow was slaughtered and the carcase examined by the owner's veterinary surgeon who found enlargement of the lymph nodes of the head and neck as the only abnormality. In representative sections of these tissues, the nodular reticulin formations of normal lymph nodes had been replaced by a diffuse reticulum packed with irregularly shaped lymphocytes. Many areas of necrosis, varying in shape and size, were seen scattered throughout the mass of neoplastic tissue.

Case 5.

Only the left side of the head was sent from a four-month-old male pig. The retropharyngeal lymph node was grossly enlarged. The follicular pattern had been destroyed by lymphomatous proliferation of lymphocytes; but fibrosis had enhanced the trabecular pattern so that some semblance of lymph node architecture was still present.

Case 6.

Portions of lymph node and lung were received with no more information than that the bronchial and mediastinal lymph nodes were enlarged and the pleura and lungs apparently neoplastic. Histologically the lymph node sections examined were hyperplastic rather than neoplastic; but the lung sections revealed an invasion of lymphatic tissue bearing with it a considerable amount of young fibrous tissue which tended to assume the rôle of lymph node stroma.

Case 7.

Portions of liver and mediastinal and retropharyngeal lymph nodes were received without any data. The liver sections showed hepatic tissue overwhelmed by an invasion of lymphocytes. In the lymph node sections there was massive lymphatic hyperplasia with virtual elimination of nodular structure, and infiltration of contiguous muscle and connective tissue.

Case 8.

Five-month-old Large White. Brain and viscera. No history. Lungs: increase in peribronchial lymphatic tissue and diffuse lymphocytic infiltration of alveolar walls and interlobular septa. Liver: severe periportal lymphocytic infiltration, widespread hepatic cell degeneration and heavy, periphero-lobular deposition of haemosiderin. Kidney: severe lymphocytic infiltration, especially in the cortex, with much degeneration of the invading cells. Spleen: spectacular proliferation of apparently all lymphoblastic elements. There were large numbers of giant cells and multinucleate cells, similar in appearance to Sternberg-Reed cells. Lymph node and thymus sections also exhibited the extreme lymphocytic proliferation, but no giant cells. Slight lymphocytic infiltration was seen in the leptomeninges and in the choroid plexus of one cerebral ventricle.

Case 9.

A sow. No data other than that the spleen measured 34 by 6 inches and weighed 8½ lb. The portion of liver examined contained focal accumulations of lymphocytes. The spleen sections revealed a solid mass of lymphocytes containing many scattered giant cells of the Sternberg-Reed type.

This letter is not the place for a detailed morphological analysis of these cases. Generally speaking they can all be gathered under the heading lymphatic leukosis, while cases 8 and 9 are possibly analogous to Hodgkin's disease as it is recognised in man. Nor is this the place for a detailed analysis of our records which do, however, suggest that lymphatic leukosis occurs in pigs not infrequently.

The histological data of cases 5 to 8 were made available by my colleague, J. T. Done.

Yours faithfully,

L. M. MARKSON.

Ministry of Agriculture, Fisheries and Food
Veterinary Laboratory,
New Haw,
Weybridge,
Surrey.

November 19th, 1955.

VETERINARY APPLICATION OF 5 : 7-DICHLORO-8-HYDROXYQUINALDINE 3 PER CENT.

Sir,—I would like to endorse Mr. A. G. Welch's opinion of the efficiency of 5:7-dichloro-8-hydroxyquinaldine in the treatment of skin lesions and wounds of various kinds.

During the past year it has been used on numerous cases of eczema and on wounds, burns, etc., and the results, compared with those obtained from the use of other dressings were most gratifying. Not only did the first application often give almost immediate relief but healing was so rapid that raw and painful lesions appeared to clear in a matter of a few days.

Owing to the apparent absence of toxicity of this preparation it can be used with complete safety on the lips and muzzle and, in fact, on any part of the body without the necessity of protective dressings. It will be appreciated that this factor is of particular importance in the case of cats.

It would seem that this preparation should play a very great part in small-animal practice, particularly as, unlike the antibiotics, it is claimed that it does not produce resistant strains thus making subsequent therapy ineffective.

Yours faithfully,

F. J. AUSTIN.

2a Streatfeild Avenue,
East Ham, E.6.

November 14th, 1955.

TICK-BORNE FEVER IN CATTLE

In reply to the letter by Messrs. Tutt and Loving on this subject, in experiments carried out at this Institute it was found that the administration of sulphamezathine to sheep during the febrile phase of an attack of tick-borne fever caused an immediate drop in temperature and disappearance of parasites from the phagocytes. There was, however, a strong tendency for the condition to reappear a week or two after dosing had been discontinued. The administration of intermittent courses of the drug might overcome this difficulty.

A further point of interest is that although all the sheep on tick-infested areas in Scotland appear to be carriers of tick-borne fever, the disease has not to my knowledge been diagnosed in cattle. It is possible that strains of the organism from South-west England are more pathogenic for cattle than the Scottish strains. Hudson, however, found quite an appreciable cross immunity between a strain supplied from this Institute and a strain isolated from cattle in Somerset. A further possibility is that the majority of cattle in tick-infested areas in Scotland are exposed to the infection and become immune as calves. Experimental infection in calves produces a silent infection which can only be detected by passage of the calves' blood to susceptible sheep, and it is possible that the clinical disease occurs in adults only.

Yours faithfully,

ANGUS FOGGIE.

Animal Diseases Research Association,
Moredun Institute,
Gilmerton,
Edinburgh, 9.

November 15th, 1955.

References

FOGGIE, A. (1951). *J. Path. Bact.* **63.** 1.
HUDSON, J. R. (1950). *Brit. Vet. J.* **106.** 3.

THE CLUB SYSTEM IN NEW ZEALAND

Sir,—May I be allowed to reply to my critics on the above subject? Messrs. Owens and Warnock suggest that "the status of the profession . . . is the result of the competence and bearing of the individual members . . . ." Whilst this is true it must be remembered that the status of a principal is always higher than that of an employee.

It is pleasing to note that the above gentlemen compared club practice with assistantships. But it must be borne in mind that one usually graduates from an assistantship to become a principal in the course of time—be it short or long. Under the club system in New Zealand there is no graduation from one status to the other as there is in the African Dominions and the colonies. What of the future for club veterinary surgeons in New Zealand?

If the authors, who quoted the ancient saying, had sufficient knowledge of private practitioners they would realise that all these members of the profession have reaped a richer harvest in all respects than they did under the club system.

It is particularly noted that nobody has explained why the Veterinary Services Council is not prepared to grant an equal voting strength to farmers and veterinary surgeons alike. Also why will the Veterinary Services Council not encourage the veterinary surgeon to become captain of his ship and master of his crew as the farmer?

Yours faithfully,

G. T. WILLIAMSON.

Birchcroft,
Sandhurst Road,
Wokingham,
Berkshire.

November 20th, 1955.